ETAAC Advanced Technology Development Report

Part B – Overview of Economic Opportunities and Challenges

Advanced technology development economic opportunities
The economic development opportunities of advanced technology development have taken even greater importance with California's severe economic downturn. The purpose of this chapter is to highlight the status of California's economy regarding "green" jobs today, identify economic opportunities for California regarding low and zero advanced technology develop, and provide recommendations related to manufacturing that cut across the technology sectors. Additional details regarding economic opportunities related to several specific technologies are covered in more detail in later chapters on transportation, energy efficiency, and renewable energy.

"Green" jobs today (see figure X below listing cleantech investment by category for a list of categories) are an increasingly important component of the workforce that exceeded 100,000 jobs as of 2007 (including zero and low-GHG jobs combined with other environmental jobs). While this sector is not yet large enough to offset the state's severe economic downturn it is important to continue growing jobs in this sector. Service jobs are the most prominent category when environmental consulting is included, while manufacturing rises to approximately half the of total jobs for the low and zero carbon technology categories of transportation, energy efficiency, and renewable energy. (CA Economic Strategy Panel)

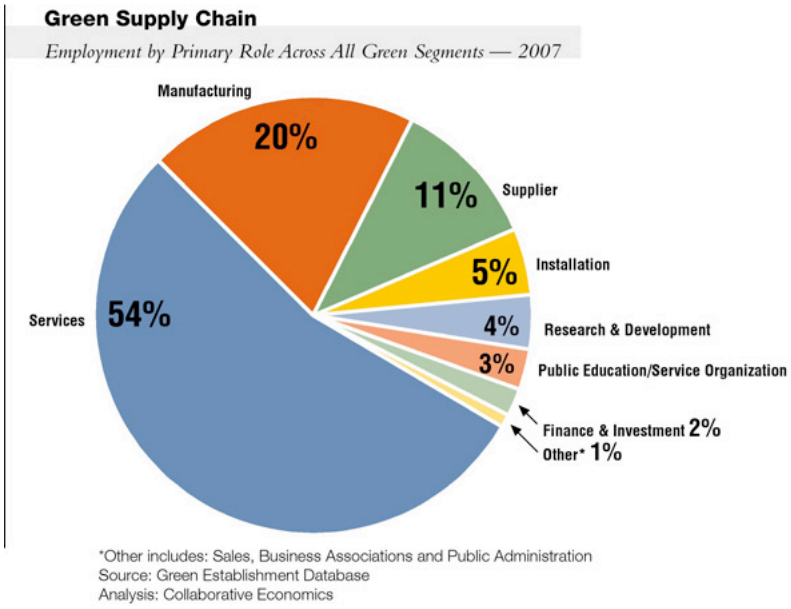

Figure X: source Next10

The leading sectors within the global five trillion dollar market (UK BERR report) for low and zero carbon technology are alternative fuels[1], alternatively fueled vehicles, renewable energy technologies and energy efficiency technologies as shown in figure X. These global market opportunities are closely aligned with the goals of the California Air Resources Board's AB32 climate change plan and in many cases air quality goals as well.

In addition, in 2008 California venture capital firms received $3.3 billion (over half of the US total), with about half ultimately spent in California (Next10, Calstart, ABAG report, CalCEF). While these levels dropped in the first quarter 2009 to $334m/quarter[2], that is approximately equal to 2006 per quarter levels. Energy generation dominates, with transportation and energy efficiency also receiving significant shares. In addition, global government 2009 investment in "cleantech" is likely to reach $200 billion, exceeding $150 billion in private capital expenditure in 2008. US incentives include $60 billion in direct spending and subsidies, $7.6 billion in financing, and a variety of tax credits (E2/Cleantech). Every $100 million in venture capital investment is estimated to create an average of 2,700 jobs (E2/Cleantech), highlighting the importance of policies that continue to attract venture capital. Leading CA sectors are energy generation (especially solar), energy efficiency, transportation & related energy storage (CA Economic Strategy Panel).

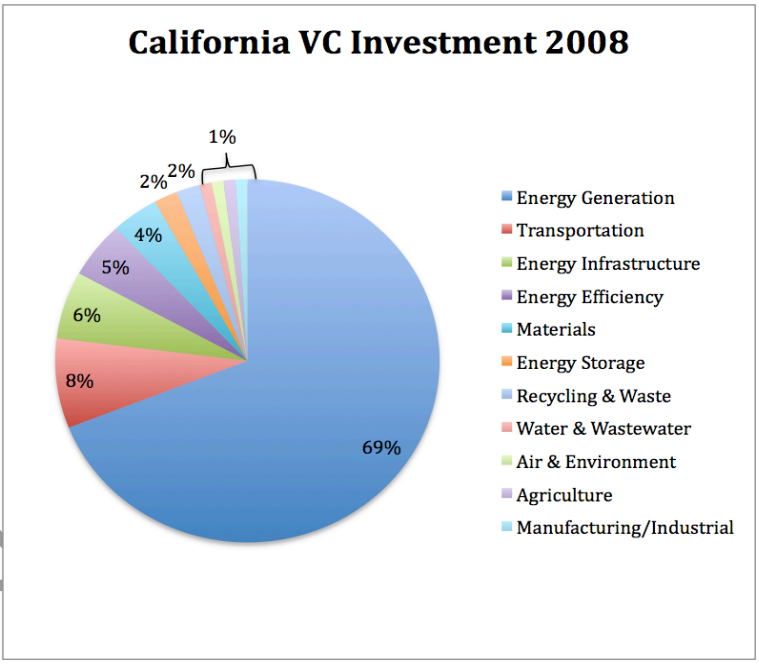

Figure X: California VC Investments 2008 Distributed by cleantech segment), Source: Next10

[1] The accounting method for this data groups nuclear energy under "alternative fuel" in the BERR-sponsored report. A separate value for nuclear energy was not provided.

[2] Venture capital declines have been due to (1) a general concern about investment risk, (2) the lack of capital from traditional investors such as university endowments and public pension funds, (3) the collapse of the market for new public offerings (4) the collapse in valuations from mergers and acquisitions, (5) more cash required by existing portfolio companies due to a shortfall in their revenues, and (6) decline in energy prices from cyclical highs in the first half of 2008.

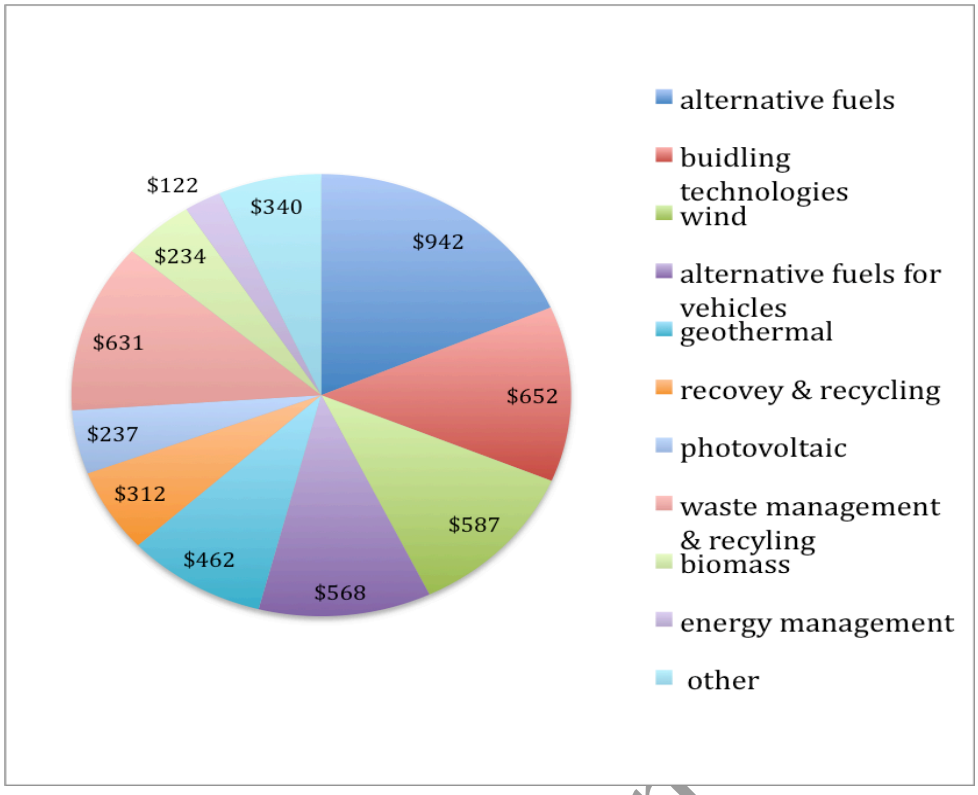

Figure X: Global "Green" Markets in 2009 US Billion Dollars (UK BEER report)

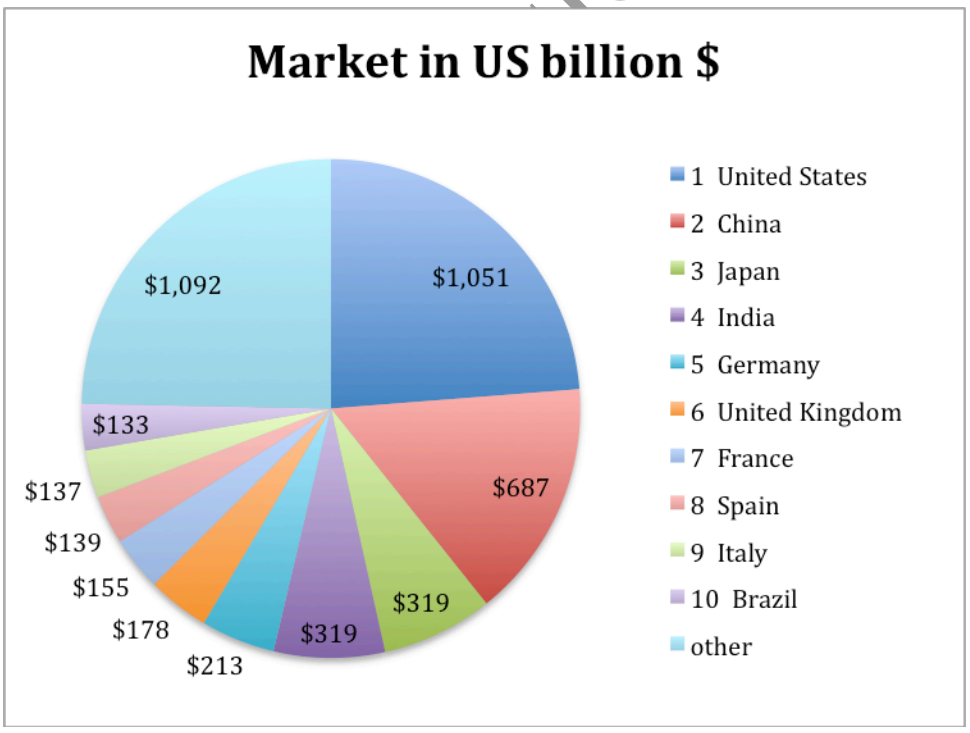

Figure X: Global "Green" Markets in 2009 US Billion Dollars

There are important opportunities for California to both encourage advanced technology development and receive economic returns. Examples of policies that create California markets (including suppliers) include AB32, the California Solar Initiative, and Proposition 118 transportation incentives. These policies together with investments and research in California, can help form clean technology "clusters" that facilitate further investment and economic development. This capability can help tilt the state toward energy efficiency & renewable energy technologies that displace imported energy supplies and create more in-state jobs (UCB Roland-Holst report, CEC power plant licensing applications). There are also challenges, as explained for the manufacturing sector below.

Some jobs created by the California market for low and zero carbon technology are local and policies to promote advanced technology development will further expand these in-state jobs, which typically pay above-average wages (Bay Council/ABAG report, CA Economic Strategy Panel). Installation and supplier jobs need to be located close to customers and are likely to be local, along with the operation and maintenance portion of service jobs. Consulting and research also have ties to local customers, although they are to some extent mobile. Perhaps the largest potential for job mobility into or out of California is in the manufacturing sector.

UK BEER report top growth areas:	
Technologies	*Countries*
Wind Turbines and Systems	China
Photovoltaics	India
Alternative Fuels for Vehicles	Pakistan
Energy Efficient Windows	South Korea
Other Alternate Fuels	Thailand

Figure X: Background on California's "CleanTech" Manufacturing

California's manufacturing sector has shrunk about a fifth in the last decade, several percent more than the rest of the US manufacturing sector, yet still continues to play an important role in the state's economy by providing a total of 1.5 million direct jobs (California Economic Strategy Panel) and important additional indirect benefits. Roughly half of California "Green" jobs for energy generation, energy efficiency, and transportation technologies are in manufacturing (including assembly) – approximately 13,000 overall[3]. Looking from the perspective of which "green jobs" sectors are the most important sources of manufacturing jobs, renewable energy (largely PV solar), lighting, environmental controls, and electric drive transportation are top sectors (the other two are heating & other machinery) (Cal Economic Strategy Panel p.17, Telsa announcement, Next10). This shows that California has an existing platform to compete for jobs from

[3] This number does not reflect recent job loses not job gains due to federal stimulus spending such as the electric vehicle and infrastructure manufacturing.

new advanced technology development such as renewable energy, solid-state lighting, monitoring & controls for energy efficiency, and electric drive transportation covered in more detail.

California manufacturing enjoys competitive advantages and also suffers competitive disadvantages for capturing these jobs. An emphasis on "specialty" & flexible manufacturing may fit well the emergence of new advanced technologies (Bay Council/ABAG report) along with proximity to financiers, markets, suppliers, and researchers. On the other hand, general economic development challenges include higher US labor rates compared to international competitors (CA varies when compared to other states) (Bay Council/ABAG), tax rates such as sale tax for manufacturing equipment (ETAAC p2-16), and higher real estate prices in addition to general barriers related to all advanced technology development. Energy costs can be an advantage or a disadvantage. Energy rates are higher (such as cents per kilowatt hour) than US averages and many international competitors, (Bay Council/ABAG) although energy efficiency programs have reduced usage to provide major cost savings (ETAAC p4-1) and ETAAC has recommended a number of opportunities to increase these savings further. This landscape favors manufacturing advanced technologies over labor-intensive high-volume products, there are no assurances that these operations will be located in-state.

Policy Recommendations on facilitating manufacturing's role in advanced technology development

Access to capital and the higher upfront capital costs for low and zero carbon technologies may be the most significant barrier limiting technology development and associated economic development. ETAAC believes that capital costs combined with other barriers identified in chapter one are the reason why technologies identified as cost-effective, such as in the McKinsey Report, are often not implemented. AB32 is likely to require significant capital investments both for manufacturers that become more efficient in response to GHG costs in their own supply chain as well as for companies responding to customer demand and market opportunities created by AB32. For instance, the capital cost of manufacturing facilities for plug-in hybrid battery packs may be $3 million per 1,000 packs annual capacity or more (Gigaton Throw-down) . Companies in California must also pay sales tax on manufacturing capital equipment, which is exempt in most other states[4].

Potential solutions could be modeled on a successful program in the United Kingdom. The UK Climate Levy imposed since 2001 recycles revenues back to businesses to help them with capital costs of making transitions to lower their carbon footprint. Companies can depreciate 100% of capital costs in the first year[5], offsetting much of incremental up-

[4]http://cpr.ca.gov/CPR_Report/Issues_and_Recommendations/Chapter_1_General_Government/Improving_Business_Climate/GG17.html

[5] This program is considered effective though not universally known and does not always completely offset the increased capital costs (House of Commons Environmental Audit Committee, ICCT/Next10 summary) and a 80% discount for meeting climate targets is another significant incentive

front costs of transitioning to efficient low and zero carbon equipment. Small businesses can access zero interest loans, and companies that meet reduction targets receive a major discount on the levy. AB32 cap& trade allowances paid for by California businesses could be similarly be used in part to provide tax advantages or low/zero cost loans that help California businesses transition to most efficient "best in class" operations while also helping create markets for advanced zero and low GHG technologies. Allowance value may be the best opportunity at the state level due to the difficulty of finding available state revenues - although there is a potential obstacle if federal legislation is adopted that constrains how the value of allowances are used. (AB32 scoping plan fees for high global warming potential gases could be used for a similar purpose.)

Another important step is making sure that small and medium sized businesses receive informational assistance accessing stimulus funding that supports advanced technology development. A UK study found that "small businesses generally have fewer resources with which to monitor government policy so are less aware of new announcements"[6], which is also true in the United States. With a major push to get one-time stimulus money out the door combined with severe state agency budget constraints, it is important to make sure that providing outreach including efforts underway at some state agencies is a high enough priority. It is also important to make sure that workforce training dollars, which address a major barrier identified in chapter one, are spent on high-priority workplace needs and not just spent quickly on temporary jobs. The original ETAAC report recommended workforce training to address the following priorities:

- Assess anticipated technological changes and workforce and training needs in advanced energy-related fields at all skill levels;
- Coordinate with relevant workforce agencies to prioritize public and private training funding in high-growth sectors;
- Identify gaps for training in emerging Cleantech sectors and existing training funding that could support Cleantech workforce development;
- Promote skilled trades in construction, manufacturing and utilities to serve the specific needs of the New Energy economy;
- Encourage resource-sharing and best practice models.

As noted in original ETAAC report (p2-7, 2-11, 4-11, 4-12, 9-5), demonstration project funding & partnerships will also benefit advanced technology development & deployment in California by overcoming demonstration project barriers noted by ETAAC.

These recommendations will facilitate the manufacturing of advanced technologies to meet environmental and economic goals, and can be best implemented as part of a comprehensive long-term economic strategy for the state.

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[6] "(HC 354, "Reducing Carbon Emissions from UK Business: The role the Climate Change Levy and Agreements, p 13 and pp29-30 with regard to UK Climate "Levy" and associated small business interest-free loans to reduce energy use)